

should be transferred straight to the intensive care unit rather than the general surgical recovery ward.

The blood loss was greater than 1000 ml in only 13% of the patients. Of the 29 patients who were re-explored for excessive bleeding not all had bled a large volume. A proportion of these patients were re-explored because of the sudden increase in tube drainage that had previously been minimal. Their subsequent recovery was uneventful.

The advantages of early extubation by the immediate restoration of spontaneous ventilation and avoidance of extra sedation have already been pointed out.¹ Other systems may benefit as well. Renal dysfunction after open heart surgery is a well recognised complication with a significant rate of mortality.⁶ Alterations in intrarenal blood flow, decrease in total renal blood flow, glomerular filtration rate, and urinary flow by continuous positive pressure ventilation are well documented phenomena. Koning *et al* have shown a clear relation between the development of acute renal failure and the duration of positive pressure ventilation after open heart surgery.⁷ In the present study only two patients developed acute renal failure. One patient developed acute toxic epidermal necrolysis due to a staphylococcal infection on the 10th postoperative day. He subsequently developed acute renal failure and died 10 days later. The second patient developed a sternal wound infection, septicaemia, and renal failure, and died four weeks after the operation. As both developed renal failure several days after the operation their management in the general surgical recovery ward can not be implicated in the development of this complication.

In the earlier study the patients were carefully selected. None had had more than two myocardial infarctions and the ejection fraction was above 45%.¹ Further, the operative procedures were mostly coronary artery bypass grafts with limited cardiopulmonary bypass and aortic cross clamp times. In our present study none of these criteria were applied as a means of selecting patients for management in the general surgical recovery ward. Moreover, the contention that cooling below 32° C would present difficulties with full rewarming¹ did not hold as the patients undergoing single valve replacement were cooled to 28° C and those

undergoing double valve replacement to 25° C.

The overall hospital mortality for this group of patients was 1.5%. This compares favourably with the reported rate of 2.37% in a non-randomised surgical cohort undergoing artery bypass graft.⁸ The average duration of stay in hospital was 9.3 days, this too was lower than that reported of 12.8 days.⁶

It could be argued that the management of these patients in the general surgical recovery ward is exactly the same as that in the intensive care unit. It is our contention, however, that significant differences exist in both capital expenditure and manpower needs between the general surgical recovery ward and intensive care unit (table 5). Table 6 shows the resulting decrease in costs. The resulting decrease in the number of days spent in hospital after operation are also evident and constitute a further area of financial savings. There are also significant planning implications in this work for new cardiothoracic units. It will not be necessary to provide such large intensive care units; most patients may be treated in a simple recovery area, with a small intensive care unit for patients experiencing complications.

We conclude that most patients undergoing open heart surgery may be safely managed in a general surgical recovery ward after operation with many advantages to both the patient and the economics of the exercise.

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Comment

The need for access to an intensive care unit is perceived to add expense and create a bottleneck to the provision of cardiac surgery. The "alternative approach" to postoperative cardiac surgical care described by Jindani and colleagues addresses an important issue but the paper met a mixed response from our advisors. The editors thought that the approach was of sufficient importance to be seen by the readers of the *British Heart Journal* who could form their own opinions as to whether the authors had made their case, but the editors also

decided to publish the paper with an editorial comment that includes the salient points raised by the advisors.

To put the report in context it is important to remember that the facilities and staff used to treat patients after cardiac surgery differ considerably. At one end of the spectrum some hospitals nurse cardiac surgical patients in the general intensive care unit of the hospital under the supervision of a hierarchical team of specialist intensive care physicians. At the other extreme are specialist cardiac intensive

care wards staffed by the surgical and anaesthetic teams that perform the surgery. The role of cardiologists and the seniority of the anaesthetists and surgeons vary but the prerequisites for a successful management structure are that there should be an individual known to carry the ultimate responsibility for the patient (almost inevitably the operating surgeon) and one of the junior staff through whom instructions and advice are channelled as a final common pathway. There must be good channels of communication between all involved. The compromise reached in any given unit depends upon history (in some hospitals intensive care started with the advent of cardiac surgery); the facility available and its proximity to the operating theatre; and the skills, enthusiasm, and personalities of the doctors.

The report from St. Thomas' Hospital documents a period of transition from the use of the general intensive care unit for all patients to the use of what Jindani *et al* call a "surgical recovery ward", which initially treated about 20% of cases in 1983 and nearly 90% in 1989.

The wish to bring about a transition such as this was not peculiar to St Thomas' but a surgeon and anaesthetist at that hospital, Bryn Williams and Chris Aps, took the initiative and their practice has been watched with interest over the years. In essence it had become clear by the end of the 1970s that the general intensive therapy unit (ITU), geared to the increasingly complex management of multisystem failure, was unnecessarily elaborate and expensive for cardiac surgical patients who in the main were becoming ever more straightforward to nurse and needed little more than cardiovascular monitoring and a tally of the blood loss. There was even the perception that keen young trainee physicians might be complicating the management by tackling each case as a problem to be solved from first principles (as might be appropriate in an unusual and complex presentation of multisystem failure in ITU) rather than adhering to the repetitive but well rehearsed protocols of routine cardiac surgical care. Those who had visited the large volume American units such as the Texas Heart Institute or the Cleveland Clinic in the 1970s saw dedicated post-operative wards for cardiac patients, but visitors who looked behind the scenes saw that those whose post-operative care become protracted were moved on to a separate area geared to multisystem support.

Jindani and colleagues describe the evolution of practice in St Thomas' Hospital but before applying its lessons to other units we must understand exactly what is conveyed by the term "surgical recovery ward" which in this context may be misleading, because it sounds like the type of unit advocated to expand day case surgery. The St Thomas' unit has resident members of the anaesthetic and surgical teams, including senior registrars, immediately available. Haemodynamic monitoring is done on

intensive care standards and there is high level of intensive care and cardiac experience among the nurses. A clear appreciation of these facts makes the difference between what Jindani styles a "general surgical recovery ward" and what many units call cardiac intensive care more subtle. Rather than detracting from the value of the paper it allows us to appreciate the appropriateness of the changes that have been made at St Thomas' without being distracted by an anxiety that patient safety is being traded for economy. Some would be unimpressed by a report that simply said "Look, no hands!"

Extubation of patients on the table is a contentious issue and is not by any means a new idea. Over 20 years ago it was a minority practice at Guy's Hospital but then, with monotonous regularity, the tube was put back, with some urgency as the patient arrived in the ITU, after a sometimes hair-raising ride in the lift. The problem is that extubation is seen as a major threshold event, determining how and where a patient can be nursed. So for organisational reasons hospitals have rules that ventilated patients cannot be nursed outside certain designated areas, such as the operating theatre and the intensive care unit. On the other hand it seems to be a safe and entirely logical practice, to delay extubation until after the vulnerable period of transition from theatre to postoperative ward, during which monitoring, drug infusions, and support systems may become tenuous. But for organisational reasons hospitals have rules that ventilated patients cannot be nursed outside of certain designated areas. As Doc Daneeka explained to Yossarian "Sure there's a catch, Catch-22".¹ These conflicting arguments, whether to extubate first and move second, or to move first and then extubate have led to various forms of fast track techniques to minimise postoperative ventilation without having to extubate the patient in the operating theatre. It is now accepted that most patients can be extubated early but at the anaesthetists' discretion, not as a tight-rope walk without a safety net.

Finally, the evidence that this method saves money, or permits more operations to be performed for the same money, may be uncertain. Readers can form their own judgement on how far it is proven to do so. If both facilities are available and acceptable within one institution a randomised comparison of cost and outcome might be conclusively proved. The authors believe that the case is made but the assertion that it is obviously cheaper is not quite the same as showing a saving in bed days and nursing hours that may have a knock-on effect on costs elsewhere.

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1 Heller J. *Catch 22*. Corgi. 1968, p54.